

WHAT IS CLAIMED IS:

1. A high frequency substrate, comprising at least:

a first metal layer;

5 a first dielectric layer on the first metal layer, wherein the first dielectric layer is

made of a high dielectric coefficient material;

a second metal layer on the first dielectric layer;

a second dielectric layer on the second metal layer, wherein the second dielectric layer is made of a low dielectric coefficient material; and

10 a high-frequency signal transmission line on the second dielectric layer.

2. The high frequency substrate according to claim 1, wherein the first metal layer is a ground plane and the second metal layer is a power plane.

15 3. The high frequency substrate according to claim 1, wherein the first metal layer is a power plane and the second metal layer is a ground plane.

4. The high frequency substrate according to claim 1, wherein the value of the dielectric coefficient for the high dielectric coefficient material is more than 4.

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5. The high frequency substrate according to claim 1, wherein the low dielectric coefficient material is polytetrafluoroethylene (PTFE).

6. The high frequency substrate according to claim 1, wherein the value of the dielectric coefficient for the low dielectric coefficient material is less than 4.

7. A high frequency substrate, comprising at least:

5        a first metal layer;  
            a first dielectric layer on the first metal layer, wherein the first dielectric layer is made of a high dielectric coefficient material;  
            a second metal layer on the first dielectric layer;  
            a second dielectric layer on the second metal layer, wherein the second dielectric  
10     layer comprises a first opening;  
            a third dielectric layer within the first opening  
            and on the second metal layer, wherein the third dielectric layer is made of a low  
            dielectric coefficient material; and  
            a high-frequency signal transmission line on the third dielectric layer.

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8. The high frequency substrate according to claim 7, wherein the second dielectric layer further comprises a second opening.

20     9. The high frequency substrate according to claim 8, wherein the high-frequency substrate further comprises:  
            a fourth dielectric layer within the second opening and on the second metal layer,  
            wherein the fourth dielectric layer is made of a high dielectric coefficient material;  
            and

a low-frequency signal transmission line on the fourth dielectric layer.

10. The high frequency substrate according to claim 7, wherein the second dielectric layer is made of a high dielectric coefficient material.

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11. The high frequency substrate according to claim 10, wherein the high-frequency substrate further comprises a low-frequency signal transmission line on the second dielectric layer.

10 12. The high frequency substrate according to claim 7, wherein the value of the dielectric coefficient for the high dielectric coefficient material is more than 4.

13. The high frequency substrate according to claim 7, wherein the low dielectric coefficient material is polytetrafluoroethylene (PTFE)

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14. The high frequency substrate according to claim 7, wherein the value of the dielectric coefficient for the low dielectric coefficient material is less than 4

20 15. The high frequency substrate according to claim 7, wherein the top superficial measure of the third dielectric layer is equal to or larger than the bottom superficial measure of the high-frequency signal transmission line.

16. A substrate, comprising at least:

- a first dielectric layer which comprises an opening;
- a second dielectric layer within the opening; and
- a signal transmission line on the second dielectric layer.

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17. The substrate according to claim 16, wherein the second dielectric layer is made of a low dielectric coefficient material and the signal transmission line is a high-frequency signal transmission line.

10 18. The substrate according to claim 17, wherein the value of the dielectric coefficient for the low dielectric coefficient material is less than 4

15 19. The substrate according to claim 16, wherein the second dielectric layer is made of a high dielectric coefficient material and the signal transmission line is a low-frequency signal transmission line.

20. The substrate according to claim 19, wherein the value of the dielectric coefficient for the high dielectric coefficient material is more than 4.

20 21. A method of forming a substrate, comprising the steps of:  
performing a first dielectric layer;  
etching portions of the first dielectric layer so that the first dielectric layer comprises an opening;

filling a second dielectric layer within the opening; and  
forming a signal transmission line on the second dielectric layer.

22. The method according to claim 21, wherein the second dielectric layer is  
5 made of a low dielectric coefficient material and the signal transmission line is a  
high-frequency signal transmission line.

23. The method according to claim 21, wherein the second dielectric layer is  
made of a high dielectric coefficient material and the signal transmission line is a  
10 low-frequency signal transmission line.

24. The method according to claim 21, wherein the opening is formed by etching.

25. The method according to claim 21, wherein the opening is formed by

15 mechanical drilling.

26. The method according to claim 21, wherein the opening is formed by laser  
drilling.

20 27. The method according to claim 21, wherein the second dielectric layer is filled  
within the opening by printing.

28. The method according to claim 21, wherein the second dielectric layer is filled within the opening by spin coating.

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